Copeland Creek Restoration Project
Monitoring Plan

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I. Introduction

The purpose of the Copeland Creek Restoration Project Monitoring Plan is to evaluate the effectiveness of the Sonoma County Water Agency's (Agency) efforts to restore fish and wildlife habitat along Copeland Creek. The Copeland Creek Restoration Project site is located along approximately 6,000 linear feet of Copeland Creek between Roberts/Pressley Road and Petaluma Hill Road, east of Sonoma State University, Rohnert Park. Restoration was necessary to minimize creek disturbance due to past land use practices and return the site to more natural conditions. Intensive historic livestock grazing along Copeland Creek degraded aquatic habitat (including habitat for the threatened steelhead), eliminated most bank (riparian) vegetation, accelerated stream bank erosion, and increased channel sedimentation. The goal of the Copeland Creek Restoration Project was to restore the natural structure and function of the reach so it more closely resembles pre-grazing conditions. The project objectives were to:

1) improve aquatic habitat and water quality through decreasing sediment, nutrient loads, and water temperature;
2) decrease erosion through development of more stable channel banks and channel courses; and
3) increase fish and wildlife diversity and abundance.

These interrelated objectives were begun by installing fencing to exclude agricultural practices from Copeland Creek (i.e., vineyard maintenance activities and livestock grazing), recontouring eroded creek banks, and planting native vegetation. The monitoring plan will measure the progress of achieving the Copeland Creek Restoration Project objectives. Monitoring activities will be conducted for at least five years and a status report will be prepared annually.

The specific monitoring components of the Copeland Creek Restoration Project Monitoring Plan are discussed in this document. Monitoring will be conducted at permanent reference sites along the creek. These sites will be established in areas with active and passive restoration. Active restoration includes physical changes such as bank recontouring, bank and terrace revegetation, and excluding livestock grazing. Passive restoration involves the removal of livestock grazing and the reestablishment of riparian and aquatic habitat from natural processes. Data collected in passive and active restoration areas will be compared to determine the relative importance between these restoration efforts. Also, restored areas will be compared with baseline data collected when restoration was implemented.

Background

Historically, Copeland Creek study area is believed to have supported a lush corridor of willow- and alder-dominated riparian vegetation and spawning steelhead. Heavy cattle grazing had severely reduced riparian habitat and limited the establishment of vegetation primarily to non-native grasses and forbs. Tree cover had been limited to an established stand of non-native eucalyptus and an occasional native oak, willow, and California buckeye. Trampling from livestock had exacerbated erosion of creek banks and had eliminated most habitat features required by

steelhead, such as deep pools with undercut banks used for cover. Also, the loss of riparian shade increased water temperatures resulting in poor water quality for steelhead.

The Agency's Natural Resources Section (NRS) restoration efforts at Copeland Creek began in 1999 and are scheduled for completion in 2003. The restoration activities have included stabilizing banks, decreasing creek sediment load, and revegetating creek banks and adjacent terraces. Fencing has been installed to prevent livestock access to the creek and to reestablish a riparian zone. Eroded banks have been recontoured to a more stable profile. Native riparian plants have been planted in highly degraded areas. Willow baffles (i.e., willow springs planted in a row) were installed along recontoured stream banks to stabilize banks and to shade the creek, thereby reducing water temperatures for fish.

II. Stream Cross-section Profile

Purpose/Description: Cross-section profiles of Copeland Creek will be used to monitor long-term trends in fluvial and geomorphic conditions of the stream channel and adjacent flood plain. Permanent transects across Copeland Creek will be established along the creek. These transects will provide an elevational profile of the creek and indicate changes over time. The collected data will be used to evaluate changes in stream bank stability, channel migration, stream scouring, and substrate deposition.

Methods: The basic survey techniques for conducting cross-section profiles at Copeland Creek will follow methods discussed in "Stream Channel Reference Sites."[1] Relevant information from this report is included in Appendix A. Data will be collected by Agency Survey staff assisted by NRS staff. A total of 12 permanent transects will be marked at their ends using re-bar stakes, as shown on Figure 1. Along each transect elevation data will be collected at one-meter intervals. Reference photographs will be taken at the south end of each transect looking north. Photographs will be used to qualitatively compare changes in steam morphology. Other elevation data to be collected along each transect line will include:

- crest of upper flood plain with creek bank
- active flood plain (toe of creek bank at streambed)
- edge of water of each channel
- thalweg (deepest point in creek channel)

Schedule: Cross-section surveys will be completed every other year in the late spring. Surveys will be completed soon after heavy rainfall and flooding has ended for the season, usually in May.

[1] Harrelson, C. C., C. L. Rawlins, and J. P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Rep. RM-245. Fort Collins, Co.: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61pp.

III. Stream Longitudinal Profile

Purpose/Description: A longitudinal profile of Copeland Creek establishes the elevation of topographical features along the stream course. This profile is important for measuring the slope of the water surface, channel bed, floodplain, and terrace. Also, the profile is essential for determining the effects of erosion and sediment deposition along the creek.

Methods: The basic surveying techniques for conducting a longitudinal profile at Copeland Creek will follow methods discussed in "Stream Channel Reference Sites."[2] Relevant methods are included in Appendix B. Data will be collected by Agency Survey staff assisted by NRS staff. As shown on Figure 1, the profile will extend along the thalweg (i.e., centerline) of the creek between Petaluma Hill Road and Roberts/Pressley Road.

Schedule: Longitudinal surveys will be completed every other year in the late spring. Surveys will be completed soon after heavy rainfall and flooding has ended for the season, usually in May.

IV. Aerial Photographs

Purpose/Description: Aerial photographs will be used to assess overall changes in stream channel, riparian cover, and watershed conditions within Copeland Creek. Historic aerial photographs of Copeland Creek from 1961 to 2000 are available from the Sonoma County Planning Department for comparison. Also, Crane Creek will be used as a reference site to compare with Copeland Creek. Crane Creek has a well-developed riparian zone, is located near Copeland Creek, and has a similar watershed size and gradient as Copeland Creek.

Methods: Aerial photographs at a scale of 1:12,000 or smaller will be flown of the Copeland Creek study area. Evaluation of riparian habitat will include qualitative description of revegetated areas and quantitative evaluation of riparian cover using a planimeter. Riparian cover at Crane Creek reference site will be quantified using a planimeter and compared with Copeland Creek riparian cover.

Schedule: Aerial photography flights will be completed at two-year intervals during the riparian vegetation growing season and when water is present in the creek, typically late spring to early summer.

V. Piezometer Well Monitoring

Purpose/Description: Piezometer wells located along the Copeland Creek study area will be used to monitor fluctuations in the shallow ground water levels. Piezometer wells are open-ended pipes that allow penetration of groundwater through the bottom only, and are not directly

[2] Harrelson, C. C., C. L. Rawlins, and J. P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Rep. RM-245. Fort Collins, Co.: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61pp.

effected by surface waters or precipitation. The subsurface hydrologic regime along Copeland Creek and the adjacent terrace is an important factor in the survival of riparian plants and the duration of summer creek flows. A prolonged shallow water table increases water available to plant roots. Also, a shallow water table late in the season increases surface water levels necessary for fish survival. Piezometer wells will determine the hypothesized correlation between reestablishment of a riparian zone from restoration and the increase in shallow groundwater depths.

Methods: As shown on Figure 1, piezometer wells are located at four stations along Copeland Creek. Each station consists of two piezometer wells. One well is situated on the flood plain and the second on the adjacent terrace. Piezometers consist of two-inch diameter, approximately six-foot-long, PVC pipes. These pipes are perforated near the bottom and allow water penetration through the lower end. The piezometer is placed in an approximately four-foot-deep augured hole and back filled with sand to allow the movement of groundwater around the well. Grout is placed around the ground surface of the piezometer (above the sand backfill material) as a sealant to prevent surface water from flowing along the sides of the pipe. A cap is placed on the pipe top to protect the well from rainfall and debris. Surface water depths in the well will be measured twice a month to monitor groundwater level fluctuations.

Schedule: Water depths in the eight piezometers will be measured on the 1st and 15th of each month.

VI. Vegetation Surveys

Purpose/Description: Vegetation surveys will monitor changes in plant communities along Copeland Creek. Due to restoration efforts, the non-native grassland that currently dominates most of the study area is expected to be recolonized with native vegetation, including willow scrub along the active stream channel, mixed riparian forest (e.g., willow, alder, and valley oak) along the stream banks, and oak woodland along the adjacent terrace. The benefits of establishing these plant communities include bank stabilization, reduced creek sedimentation, improved water quality, and enhanced fish and wildlife habitat.

Methods: The line intercept method will be used to quantify plant community cover and composition. Thirty-six permanent transects will be placed perpendicular to the creek channel (Figure 1). Transects will be placed in areas with active and passive restoration. Transects will extend between the study area fence lines or at least 50 meter (m) across the creek. Transect ends will be marked by rebar stakes and labeled. At 1-m intervals along the line transect, beginning at the north end, presence of plant species will be recorded for four different canopy layers by visually extending a vertical line from the intercept point. The canopy layers include grass/forb, shrub (0-2.4 m), sub-tree (2.5- 7.8 m), and tree (> 7.9 m). All herbaceous plants, regardless of size, will be included in the grass/herb layer. Woody plants will be placed in layers based on height. If the transect line intercepts several species within one layer, each species will be recorded. Also, for the line to intercept a plant species, the species must either be rooted below the point or have at least two points of canopy contact. At transect points with no plant species "bare ground" will be recorded in upland areas and "cobble/gravel" in the active stream channel. Also, plant community/habitat zones along the transect will be visually assessed by recording the

distance at zone boundaries. There will be no plant community overlap in determining boundaries (e.g., the canopy of eucalyptus trees will determine the boundary between eucalyptus forest and grassland regardless of the grassland understory). “Active channel” habitat zone will include the bank width flood zone that is primarily devoid of vegetation from annual scouring. Active channel may extend across plant communities (e.g., active channel may include portions of willow scrub). A blank data sheet for vegetation sampling is included in Appendix C. Data on plant species composition and community cover will be compared with baseline data and areas with active and passive restoration.

Schedule: Vegetation surveys will be completed by NRS staff annually in the late spring or early summer. Surveys will be completed during the growing and blooming period for most riparian species, typically May or June.

VII. Stream Habitat and Fish Surveys

Purpose/Description: Stream habitat surveys will assess steelhead habitat along Copeland Creek. Also, visual surveys for steelhead will be conducted. Data from these surveys will identify habitat used by steelhead, quantify aquatic habitats (i.e., runs, riffles, and pools), and characterize the composition of the streambed (i.e. silt, sand, gravel, cobble, etc.). Streambed substrate is an important indication of stream character and water quality. This information will be used to evaluate salmonid spawning and nursery habitat value. The results of annual surveys will be compared to determine the effectiveness of the Agency's creek restoration efforts to enhance habitat for steelhead.

Methods: Stream habitat survey methods will be completed by NRS staff and will follow accepted techniques developed by regulatory agencies. Surveys will be conducted along the creek between Roberts/Pressley Road and Petaluma Hill Road. Aquatic habitat surveys will follow Habitat Inventory Methods developed by California Department of Fish and Game.[3] Stream substrate surveys will follow standard pebble count procedures.[4, 5, 6] Substrate sampling along the stream channel will be conducted at the five active and passive restoration reaches in the study area. Samples will be collected within two creek meanders that is characteristic of the reach. Ten transects will be placed at regular intervals along the reach segment and 10 pebbles will be collected along each transect at regular intervals. Substrate data will be used to compare substrate differences among the five restoration reaches and the composition of riffles, runs, and pools. Also, visual surveys for steelhead and other fish will be conducted along Copeland Creek during aquatic habitat surveys. Relevant survey techniques, data analysis, and field data sheets are included in Appendix D.

[3] California Department of Fish and Game (CDFG). 1998. California Salmonid Stream Habitat Restoration Manual. Third Edition. January.
[4] Rosgen, D. 1996. Applied River Morphology. Printed Media Companies, Minneapolis, MN.
[5] Harrelson, C. C., C. L. Rawlins, and J. P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. Gen. Rep. RM-245. Fort Collins, Co.: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 61pp.
[6] The Reference Reach Field Book.

Schedule: Stream habitat and fish surveys will be completed by NRS staff annually in spring. Surveys will be completed soon after heavy rainfall and flooding has ended for the season, usually in April.

VIII. Reptile and Amphibian Surveys

Purpose/Description: Monitoring restoration of Copeland Creek will include surveying for reptiles and amphibians (herps) to evaluate the effects of habitat restoration on these species. Herp surveys will determine the species composition in the study area, the relative abundance of species, and habitats used for breeding, nursery, and foraging. Restoration at Copeland Creek will change the current grassland habitat to a mosaic of riparian and woodland habitats, and increase the diversity of aquatic habitats. These habitat changes are expected to enhance habitat for several native frog, salamander, lizard, snake, and turtle species. Several rare herp species are known to occur upstream from the study area, including red-legged frog, foothill yellow-legged frog, and western pond turtle. Foothill yellow-legged frog has been observed in the upstream portion of the study area. It is anticipated that many of these rare species, as well as common herps, will begin to colonize or expand their use of the study area now that restoration is underway.

Methods: Survey methods for herps will include visual searches and pitfall trapping, as shown on Figure 2. Daytime visual surveys will focus on observing aquatic and semi-aquatic herps that are diurnal and breeding sites of amphibians. Pitfall trapping will be used to identify herp species that are often missed during visual surveys. The methods to be used for visual surveys and pitfall trapping is discussed below.

Visual Surveys: Visual surveys will consist of NRS staff slowly walking upstream along Copeland Creek channel and banks searching for herps. Surveys will be conducted in the morning or afternoon during fair weather conditions. All herps observed will be identified to species, the age class of individuals will be noted (i.e., egg, tadpole [amphibians only], sub-adult, and adult), and their location noted on a map. Breeding and nursery sites of amphibians will be recorded. Field forms and maps are included in Appendix E. Also, visual surveys will be conducted at a reference site to compare with survey results at Copeland Creek and to determine natural fluctuations in species abundance due to annual weather conditions. Crane Creek at Crane Creek Regional Park will be considered as a reference site.

Pitfall Trapping: Pitfall traps and drift fences will be used to capture herps within the Copeland Creek study area. Twenty trapping stations will be placed along the creek. Trapping will be conducted in areas with active and passive restoration. Each trapping station will consist of a low fence that directs animals into traps placed at the ends of the fence. A pitfall trap will consist of a 5-gallon plastic canister (paint can) buried with its open end at the ground surface. Trap design will follow CDFG “Pitfall Trap Protocol,” including holes near the bottom to allow

drainage, a lid over the top to provide shade, and a damp non-cellulose sponge to provide moisture for animals. Each drift fence will be 25-foot-long, two-foot high aluminum flashing, or a similar material, buried at the bottom and staked at the ends for support. During trapping periods, traps will be checked daily in the morning, usually at 8 a.m. Captured herps will have the following information recorded: species, body length (i.e., all amphibians and lizards: snout-to-vent; snakes: total length; turtles: carapace), and trap location. Also, herps will be uniquely marked for recapture identification by toe-clipping amphibians and lizards, scale-clipping snakes, and scute-notching turtles. Animals will be immediately released after they have been processed. If small mammals are inadvertently captured in traps, handling and safety procedures will be followed, including the use of eye protection and gloves, as discussed in the below Small Mammal Survey section. Mark and recapture data will be used to estimate the populations of herp species and to evaluate their movement patterns. Traps will be securely closed with tight lids when not in use. Fencing will be removed during non-trapping periods. Field forms, amphibian identification diagrams, and marking techniques are included in Appendix E.

Schedule:
Visual Surveys: Visual surveys will be conducted at weekly intervals during the spring and summer. Three surveys will be completed in the spring during peak breeding activity, usually in April or May. Three surveys will be completed in the summer when juvenile amphibians are often dispersing, usually in July or early August.

Pitfall Trapping: Pitfall trap surveys will be conducted in the spring for a two to six week period depending on weather conditions, usually in April or May.

IX. Bird Surveys

Purpose/Description: Bird monitoring will be used to evaluate the effects of habitat restoration on bird use within the Copeland Creek study area. Changes in habitat structure as a result of restoration activities are expected to result in changes in bird species abundance and diversity. The grassland that currently dominates the study area will eventually transform into a multi-layered riparian habitat with herb, shrub, and small and mature tree layers. Increased riparian bird breeding use and decreased grassland bird species use of the areas adjacent to the creek are anticipated. Long-term annual bird monitoring will allow these changes to be observed and recorded. Bird surveys in the study area will be conducted in the spring to determine breeding and nesting activity of birds and in the winter to determine winter-resident bird use.

Methods: Monitoring of birds within the study area will include point count and area search survey methods. During the breeding season, point counts will be conducted. Area searches will be conducted during the winter. Currently, demographic monitoring methods (constant-effort mist netting and nest searches) are not proposed for this study. In the current grassland habitat, these methods are ineffective. Also, demographic monitoring methods are time and labor intensive. Once riparian habitat is established, collection of demographic information will be

reassessed. Point count and area search survey methods are based on Ralph et. al.[7] and are discussed below.

Point Counts: The point count method is used to determine relative abundance, species diversity, and species richness during the breeding season. Using this method it is possible to monitor annual changes in bird populations at fixed points, differences in species composition between habitats, and to assess species breeding status. This method is currently used by the U.S. Fish and Wildlife Service for its Breeding Bird Survey and is one of the standardized methods recommended by the California Partners in Flight Riparian Bird Conservation Plan.[8] Please see Appendix F for additional information on the point count method.

Intensive fixed-radius censuses will be used. Ten point count stations spaced approximately 200 m (approximately 656 ft.) apart will be mapped and permanently marked in the field, see Figure 2. All birds observed inside and outside a 50 m (164 ft) radius from the observer will be recorded. Point counts will be conducted by no more than two people in order to reduce disturbance and maintain consistency in data collection.

Point counts will be performed at least three times during the breeding season (late April through June), with at least 10 days between surveys, and should be performed at approximately the same time of year each season. Censuses will be conducted during early morning hours and completed within 3 to 4 hours of local sunrise. Censuses will not be performed during high winds, rain, or other conditions that would reduce detectability of birds. The order in which stations are censused varies between visits. Each station should be approached with as little disturbance as possible. Counts last for five minutes and begin immediately upon arriving at the station. Birds flushed upon the observer's arrival at a station are included in the count.

Species are recorded in the order that they are observed and each individual is recorded separately (see Appendix F for Point Count Data Form). Individual birds are recorded based on whether they are detected within the 50 m radius, outside 50 m, or flying over but not landing within the census area. If a bird is first observed outside 50 m, but moves inside during the census, it should be changed from the ">50m" column to the "<50 m" column. Since the goal of the restoration project is to develop riparian habitat from the existing grassland, birds observed should be listed by the type of habitat they are observed in (inside riparian versus outside riparian). The means of detection (i.e., song, visual, or call) should also be noted. When recording means of detection, the order of priority is song, visual, and calls. If an individual is initially detected visually, but is then heard singing, the record should be changed from "V" to "S." This is because for most species, singing is a sign that the bird is defending a territory. If a woodpecker is identified by its drumming or a hummingbird by its humming, these should be noted by a "D" or "H," respectively.

[7] Ralph, J. C.; G. R. Geuple; P. Pyle; T. E. Thomas; and D. F. DeSante. 1993. Handbook of field methods for monitoring landbirds. Gen. Tech. Rep. PSW-GTR-144. Albany, CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture. 41 pp.

[8] Riparian Habitat Joint Venture. 2000. Version 1.0. The riparian bird conservation plan: a strategy for reversing the decline of riparian associated birds in California. California Partners in Flight. http://www.prbo.org/CPIF/Riparian/Riparian.html.

For each point count station, a vegetation assessment will be performed once each season during the breeding season, usually in May. Typically this will be done around the same time as the second point count census. Collection of vegetation data allows each point to be classified into habitat types and to gather vegetation and limited landscape data (including measurements of habitat changes) that can be related to bird numbers. One form will be filled out for each point count station. Appendix F includes protocol for Point Count Vegetation sampling and a data form.

Area Searches: Area searches will be conducted to assess habitat use by winter resident bird species. An area search is a time-constrained census performed in a defined habitat and provides information on relative abundance, species diversity, and habitat relationships. The Copeland Creek study area will have three plots consisting of approximately 3 ha (60.96 m wide by 491.9 m long) each. Although the plot size is rather small for the current grassland habitat type, riparian habitat is expected to replace grassland and 3 ha is an appropriate size for forested habitats. Each area search plot is covered by meandering transects in 20 minutes. Observers are free to stop the area search (and the clock) to investigate songs, calls, or other activities, but should not spend too much time off the clock. During the census, every individual is recorded. As with point counts, each individual is recorded by means of detection (song, visual, or call, in order of priority). Observed behaviors are recorded in the Behavior column. Please see Appendix F additional information on area search methods and data forms. Any birds observed flying over, but not landing within the plot, should be recorded in the Flyovers section of the data form.

During winter months (December, January, and February) area search plots will be visited at least once during each month. The same exact plots must be censused annually and at approximately the same time of year. Area searches will not be conducted during high wind, rain, or other conditions that reduce detectability. All three plots will be done in a single morning and finished within five hours of local sunrise.

Area searches can be performed by more than one observer, but no greater than six. During the census, observers will stay together and record all observations on the same sheet as the designated recorder. This minimizes counting a single individual more than once.

Schedule:
Point Counts: Point count censuses will be performed three times during the breeding season (late April through end of June) with at least 10 days between each census.

Point Count Vegetation Assessment: Vegetation assessment will be performed once each season typically at the same time as the second point count census.

Winter Resident Area Searches: During winter months (December, January, and February), area search plots will be visited at least three times (once each month).

X. Small Mammal Surveys

Purpose/Description: Mammal trapping will be performed to acquire baseline information on small mammal species present within the study area. Information collected during the species

inventory can be used as a basis for assessing future trends in small mammal species diversity as restoration activities are anticipated to alter habitat conditions within the study area. Small mammal trapping for the species inventory will be performed in late spring and early summer.

Methods: The study area is divided into five areas for the purpose of conducting small mammal surveys consisting of active and passive restoration areas, as shown on Figure 1. Small mammal trapping methods are based on American Society of Mammalogists (1998).[9] Two 150-meter (m) line transects will be placed within each area, and will be randomly located on each side of the creek. Shermin live-traps will be placed every 15 m along the line transects. Traps will be placed at appropriate habitat features (logs, runway, burrows) within 2 m of each station. A stake, with a brightly colored flag attached, will mark the beginning and end of each transect. The location of each trap along the transect will be flagged so that traps can be relocated quickly.

Traps will be opened each evening at dusk. Each trap will be baited with a small amount of peanut butter and rolled oats. Bedding material (cotton batting) will also be placed inside each trap. All traps will be checked beginning at dawn the following morning. Each transect will be checked sequentially to minimize overlooking a trap location. A minimum of two people are required to check the traps each morning. Unoccupied traps will be emptied of bait and closed for the day. Occupied traps will be processed by two people. One person will handle the captured animal and the other will complete the data form. Occupied traps will be opened by placing a heavy-duty plastic bag over one end of the trap and opening the trap into the bag. The captured animal will be identified to species (if possible) and weighed while in the bag. The animal will be picked up by the nape of the neck and removed from the bag. The animal will be measured, sexed, and reproductive status noted. The animal will then be released at the closest appropriate habitat feature to the capture location. Each captured animal will be processed quickly to reduce handling time. Mammal identification key and field form are included in Appendix G.

Animal handling and processing will be conducted or directly supervised on-site by permitted persons. Persons handling the traps and/or animals must wear leather gloves and protective eyewear at all times. All traps will be emptied of bait and droppings at least 2 m away from the trap location. Traps should be emptied directly onto the ground, downwind of the person handling the trap. Anyone handling the traps and/or animals should remove gloves and eye protection and thoroughly wash their hands with soap and water before eating or drinking. No eating or drinking is allowed while processing traps or animals. Water and soap will be provided on-site to allow for cleansing prior to leaving the study site. It is recommended that anyone handling the animals also change their clothing after processing animals.

Schedule: Small mammal trapping will be performed over five consecutive nights from mid-May through mid-June.

[9] American Society of Mammalogists. 1998. Guidelines for the capture, handling, and care of mammals. As approved by the American Society of Mammalogists, prepared by the Animal Care and Use Committee.

XI. Conclusions

Implementation of the Copeland Creek Restoration Project was the first step in restoring ecosystem function of a historically degraded stream. This monitoring plan will follow and quantify the natural processes of returning Copeland Creek to a high-value habitat for fish and wildlife. This model project will be used to guide future restoration planning in the Russian River watershed.

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